

AGUIRRE POWER COMPLEX
NPDES PERMIT RENEWAL APPLICATION
PERMIT NO. PR-0001660
JUNE 2015

7.0 FUTURE PLANNED IMPROVEMENTS

PREPA is planning the following improvements at the Aguirre Power Complex (APC):

7.1 Water Supply from the Patillas Irrigation Channel to the APC Project

The project will assure a consistent water supply to the APC, since the current well water supply has been contaminated by saline intrusion, affecting the quality of the South Aquifer, and thus, the potable water supply of the area. Also, the project considers the reuse of process wastewater that is currently discharged thru the APC Outfalls 001,002, 003 and 004. The water supply will be transferred from the Patillas Irrigation Channel to the retention ponds to be located at the APC through a 16" diameter pipeline. Thereafter, the water will be treated by ultrafiltration, reverse osmosis and demineralization methods for power generation. Once the project is completed and commissioned, the current well water supply will be serving as a back-up only.

PREPA has been issued an approval to use funds under the Commonwealth of Puerto Rico's Water Pollution Control State Revolving Fund Program (SRF Program), to finance the design and construction of the Water Supply Project from Patillas Lake Irrigation Channel to APC (Project Number C-72-128-19). The Puerto Rico Environmental Quality Board (PREQB), as the administrator of the SRF Program, has notified PREPA about the qualification and approval of the Project for the mentioned loan.

The Project entails the construction of a weir in the irrigation channel to increase the hydraulic intensity in order to allow the removal of approximately 2.4 millions of gallons daily. The installation of the underground HDPE pipeline (16" diameter) will be done in a trench measuring 0.3 m wide by 0.91 m deep that will run along PREPA's 230 KV Right of Way. This pipeline will arrive at the area where PREPA's well number 6 is located. The pipeline will cross PR-3 once it reaches PRASA's pumping station by means of a 0.91 meter deep trench. See Appendix 7A.

The project includes the construction of two ponds at the APC premises, which will be located to the west of the fuel reserve tank farm. Each pond will have the capacity to contain 2.5 MG of water. The area for these ponds requires some preparation, but no excavation, since they will be constructed by erecting dikes above the existing terrain. The ponds will be isolated using polythene liners. The external dimensions are 91.44 meters x 83.51 meters x 3.96 meters each.

The project has an approved environmental document, as well as the required permits and endorsements. The project began in August 2013, and is expected to be completed by the end of 2016.

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7.2 Aguirre OffShore Gas Port

The Project is to be located in Salinas along the southern shore of the Commonwealth of Puerto Rico, in Commonwealth waters. The Project is being developed by Excelerate Energy in cooperation with the PREPA for the purpose of receiving and storing liquefied natural gas (LNG) to be acquired by PREPA, re-gasifying the LNG, and delivering natural gas to PREPA's existing Aguirre Power Complex (APC). The Project will include an LNG terminal and facilities that will be sited, constructed, and operated pursuant to Section 3 of the Natural Gas Act (NGA), 15 U.S.C. §717b. The Offshore Gas Port will comprise the LNG terminal facilities to be certificated by the Rule 1305 Mixing Zones of Puerto Rico Water Quality Standards (PREQ, 2010). The withdrawal of seawater and discharge to marine waters would constitute a permitted activity under a surface water National Pollutant Discharge elimination System (NPDES) program permit, which will be under the full control of Excelerate Energy. None of the discharges from this facility will be done through the APC's NPDES permitted outfalls.

The Project will utilize Excelerate's Energy's proven Energy Bridge™ technology to receive, store and vaporize LNG for delivery as natural gas utilizing one of Excelerate Energy's existing Energy Bridge Regasification Vessels (EBRVs) functioning as a floating storage and regasification unit (FSRU). The FSRU will have a storage capacity of approximately 150,900 m³ of LNG. PREPA will contract 100% of the available capacity (storage and delivery throughput) from the FSRU. The FSRU will operate in the closed loop regasification mode and will have the capability of sustained delivery up to approximately 500 MMscf/d of natural gas and peak delivery up to approximately 600 MMscf/d. LNG will be delivered to the project via LNG carriers (LNGCs), unloaded and stored within an FSRU, re-gasified on the FSRU, and delivered directly to the APC by a subsea pipeline.

The project will consist of three main components: 1) an offshore berthing platform; 2) an offshore marine LNG receiving facility (Offshore Gas Port) consisting of an FSRU moored at the offshore berthing platform; and 3: a subsea pipeline connecting the Offshore Gas Port to the APC. See Appendix 7B.

The current purpose of the Project is to provide up to 3.2 BcF of LNG storage capacity and sustained deliverability of 500 MMscf/d, with a peaking deliverability of up to 600 MMscf/d, of natural gas directly to the existing APC. The project will allow PREPA to complete its conversion of the APC from fuel oil only to dual-fuel units capable of burning diesel and natural gas for the combined cycle units and fuel oil and natural gas for the thermoelectric plant.

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7.3 Impingement Mortality Low Impact Traveling Screens

In order to lower Impingement Mortality (IM) moving forward, PREPA is in the process of installing, for pilot test purposes, at its South Coast Power Plant (SCPP) a state of the art traveling water screen with fish protection features manufactured by Hydrolox™. The Hydrolox™ screen is engineered polymer traveling water screens with fish protection features. The Hydrolox screen has a smooth polymer surface and minimizes impingement mortality through the use of "fish scoops," similar to fish buckets used in Ristroph screens. Fish are rinsed into a collection trough by a low pressure screen wash system as each bucket passes over the top of the screen. From there the fish are transported by gravity through a fish return line and released back into the receiving water body. Appendix 7C includes information of this system.

Because of the similarities in intake conditions between SCPP and APC, PREPA expects that the results of the SCPP pilot test of the Hydrolox™ Screens will be directly applicable to APC. If the operation of the new Hydrolox traveling screen at SCPP meets PREPA's IM&E requirements, including the requirements triggered by the recently promulgated revised 316(b) regulations for existing CWIS facilities, then one or more APC intake screens may be replaced with these or other, 316(b) rule compliant intake screens.

7.4 Fish Return System Project

The existing Fish Return System consists of six (6) fiberglass debris trenches that capture and conduit debris and organisms to a common concrete return trench. It collects the discharges from all the trenches and then conveys fish and debris back to the water body at a considerable distance from the intake structure entrance.

To ensure safe return of healthy fish to the sea, modifications will be performed in the return system to provide enhanced fish protection. With a goal of reducing or eliminating impinged organisms injury due to impact with the grating; it will take out (cut off) the section of the grating near the entrance to the trench and replace it with a trench cover as a safety and protective measure. To prevent abrasion stressor to the organisms, long radius Elbows curves will be used. To achieve this, a sharp angle in the return trench has to be modified. To minimize the stressors of shear, turbulence, abrasion and impact in this area, curve angle (smooth edge) will be formed using a stainless steel sheet and the space between the existing curve and the sheet will be filled with concrete to avoid a hollow space.

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7.5 Floating Debris Barrier Project

PREPA is in the process of conducting a pilot project at the South Coast Power Plant (SCPP). The pilot test will preliminarily determine if a novel "floating barrier" system will consistently and measurably lower entrainment levels at the intake, as needed to comply with the requirements of the Section 316(b) of the Clean Water Act (CWA) for cooling water Intake structures.

If the SCPP provides the expected results, then APC will begin the process evaluate the install and pilot test a floating barrier. The project will include the installation of a floating debris barrier in front of cooling water intake structure. This technology combines floating docks with suspended skimmer panels extending downwards into the upper six feet of water column beneath the dock system. The floating debris barrier with skimmer panels act similar to a skimmer wall, allowing the selective passage of deeper water by the barrier, while retaining floating debris and possibly aquatic organism in the upper layer. Appendix 7D includes information related to the aquatic barrier.

7.6 Travelling Screens Surface Coating

To comply with the NPDES Permit, PREPA will evaluate and implement possible changes in operation and maintenance practices/procedures for the intake structure that could lead to further reductions in impingement mortality and/or entrainment.

Taking this into account, PREPA will be conducting a pilot test during which an enhanced surface coating will be applied to one of the existing traveling screens. The new coating is expected to achieve a reduction in the needed screen wash water pressure that should improve impingement survival by reducing the biological organic adherence. Currently, the travelling screens are washed with a pressure of about 60 psig. Upon implementation of this measure, PREPA expects to be able to reduce the screen wash water pressure significantly.

To select the adequate coating PREPA evaluated different kind of products in compliance with the National Association of Corrosion Engineers (NACE), the Society of Protective Coating (SSPC), International Organization of Standardization (ISO), and the American Society of Testing Materials (ASTM) standards. After the evaluation, a list of products that complied with the standards was recommended.

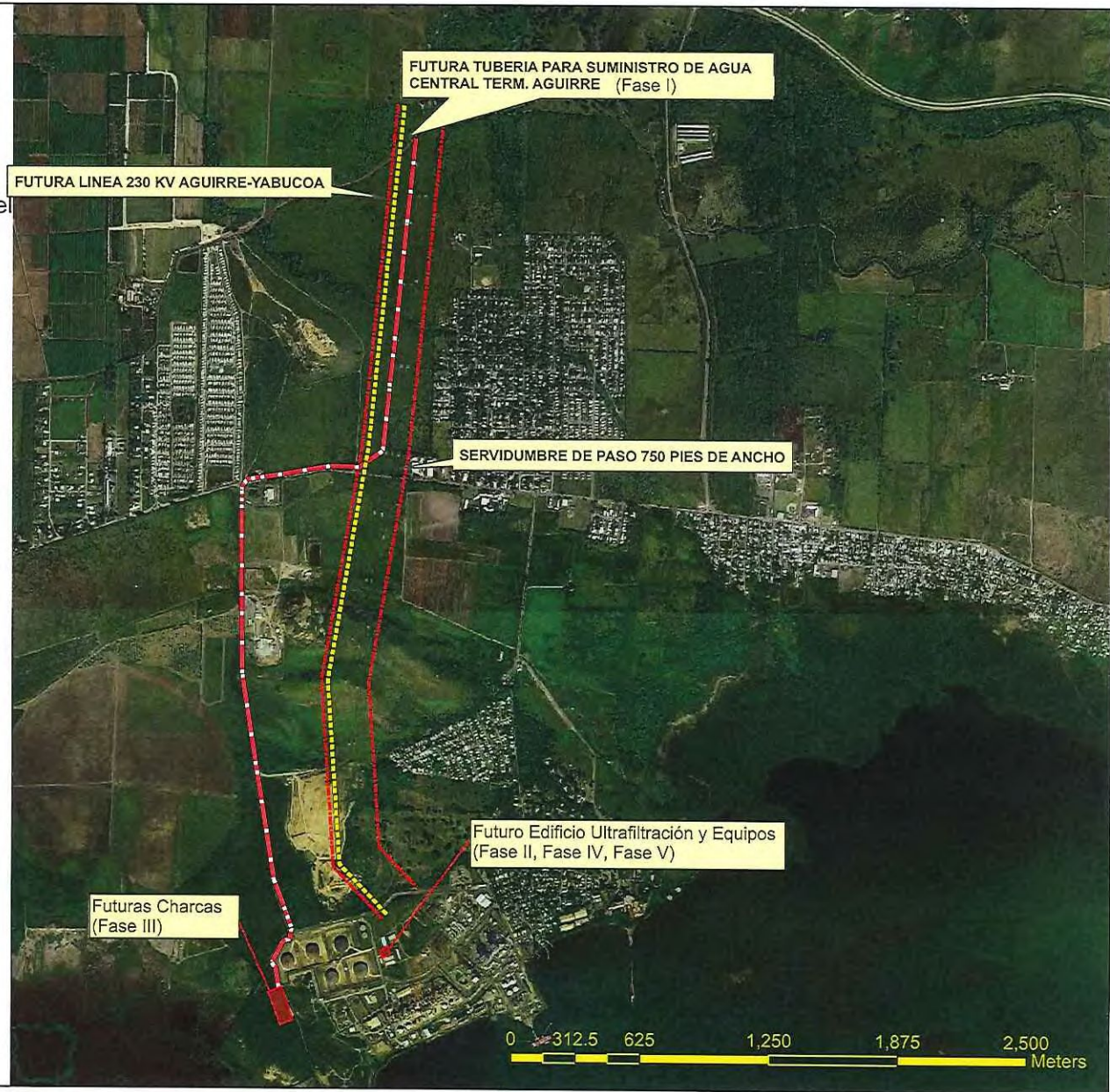
PREPA is in the process of testing the recommended products. These products will be applied according to the manufacturers' requirements and will be tested for at least six months under the same operational conditions and environmental exposure under which the screens normally perform. Once the test period is over, the tested products will be evaluated using a Coating Condition Assessment to determine which product is more effective in reducing the needed screen washing pressure.

APPENDIX 7A

WATER SUPPLY FROM PATILLAS IRRIGATION CHANNEL TO AGUIRRE POWER COMPLEX

Appendix 7A

Water Supply from Patillas Irrigation Channel
to Aguirre Power Complex



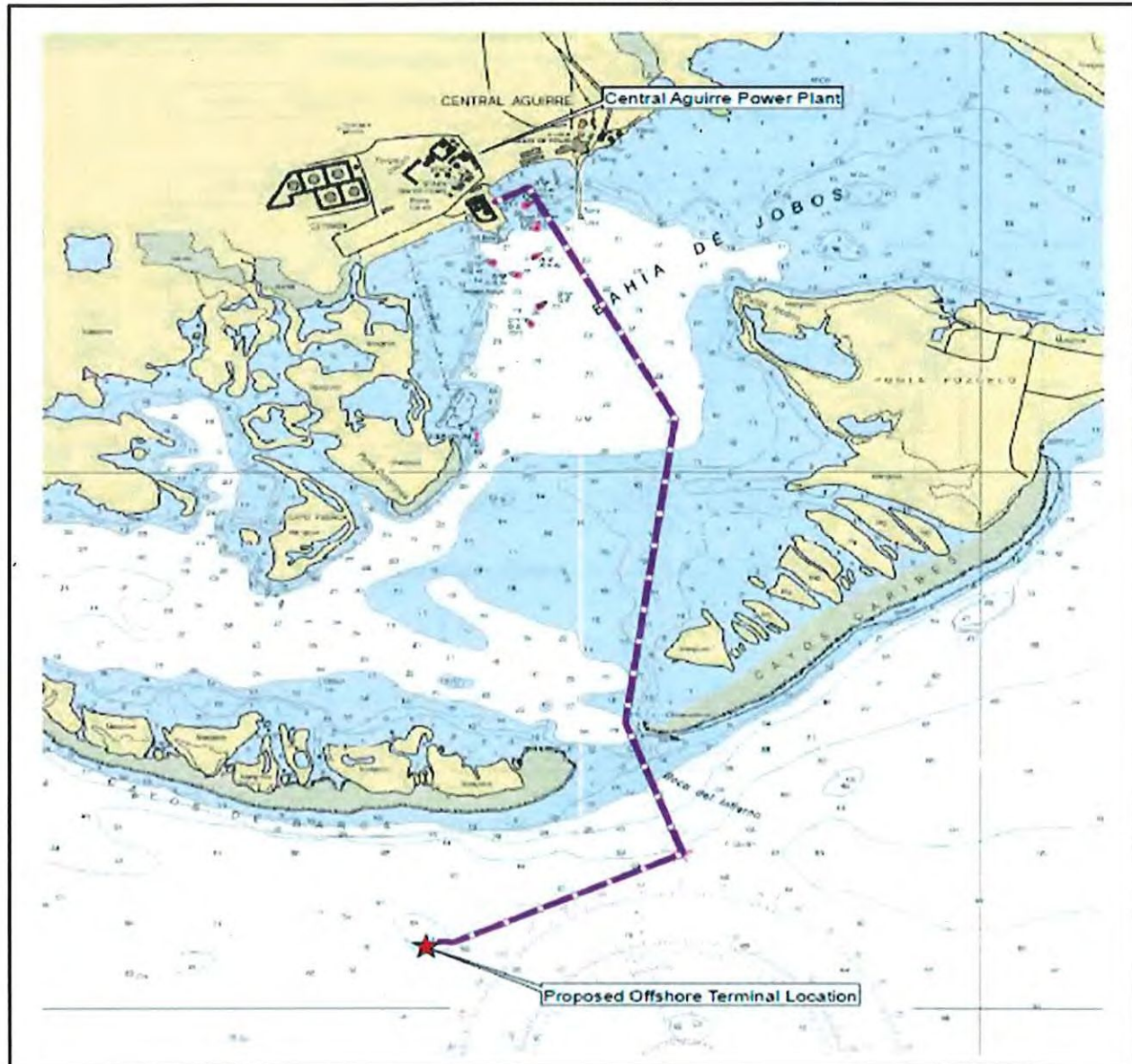
APPENDIX 7B

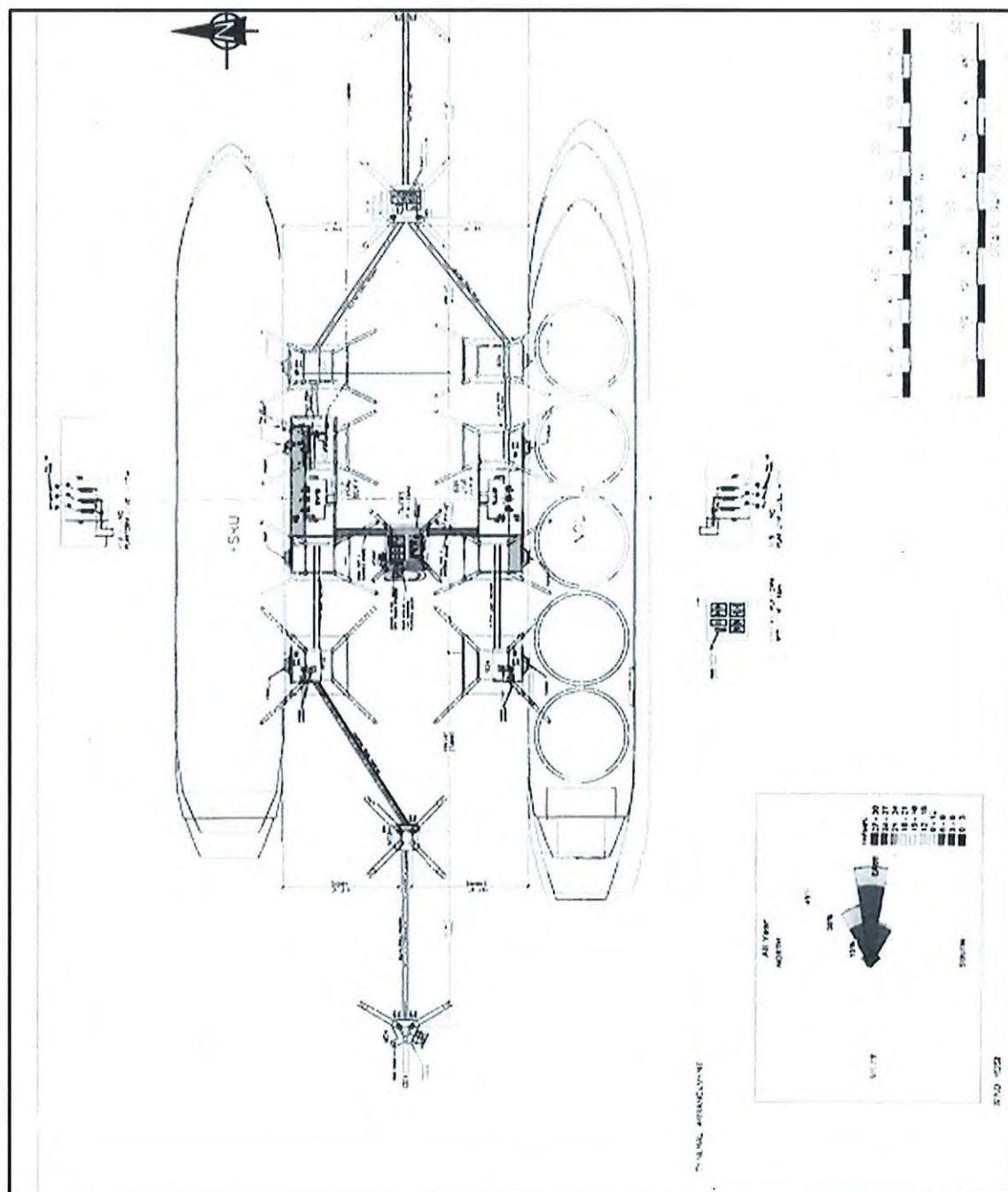
AGUIRRE OFFSHORE GAS PORT

Appendix 7B

Aguirre Offshore Gas Port

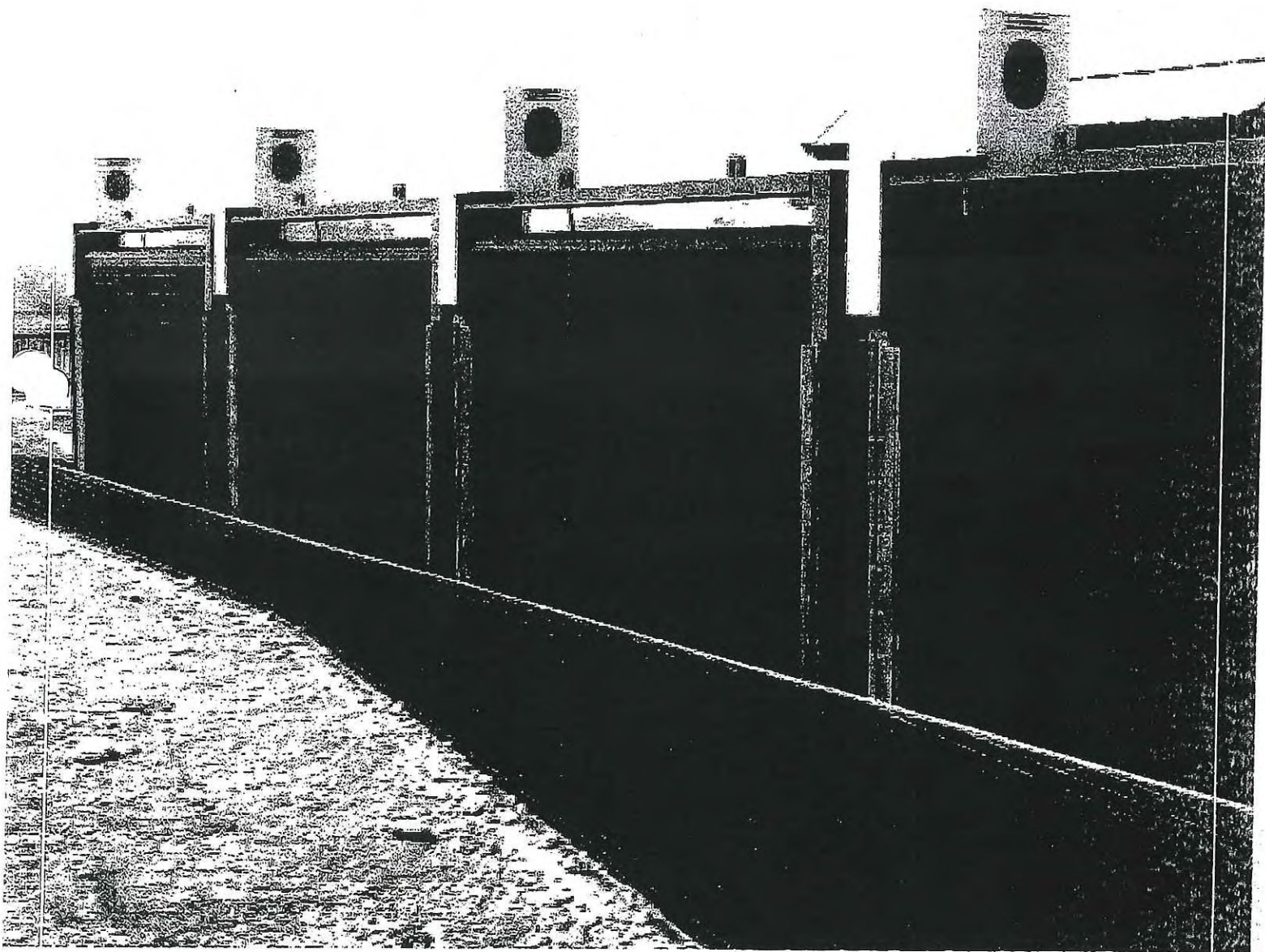
Schematic Drawing





APPENDIX 7C
HYDROLOX SCREENS


Hydrolox traveling water screen technology for hydropower plants



hydrolox®
ENGINEERED POLYMER SCREENS

The anti-corrosion, anti-abrasion, low-maintenance traveling water screen solution

Hydrolox vertical traveling water screens are engineered and constructed to combat the costliest and most persistent screening issues in hydroelectric power.



Even in the most abrasive and corrosive environments, Hydrolox water screens improve operational efficiencies and virtually eliminate maintenance costs.

A Better Water Screen Idea

Hydrolox engineered polymer technology is changing the way hydropower facilities think about water screen performance—with longer-lasting, easy-to-install engineered polymer screens.

It's proven technology, with significant advantages over fixed steel plate and wedge wire screens. The tight screen mesh reduces debris pass-through while the unique self-cleaning feature effectively prevents debris buildup. The result: a consistently steady flow of water to the turbine, reduced time spent on cleaning, and fish protection criteria met.

In addition, Hydrolox screens are approximately 40% lighter than comparable steel screens, rendering them safer and easier to work with.

Built-in Strength and Durability

Hydrolox water screens derive much of their longevity and ease of operation from the positive drive system in which the modular screen mesh articulates around engineered polymer hinge rods and high-strength stainless steel sprockets. This drive system has proven its durability in thousands of applications worldwide.

The Modular Screen Concept

Hydrolox water screens are assembled in an interlocked, bricklaid pattern with full-length hinge rods—an inherently strong system that allows fast, in-place maintenance and repairs without special tools.

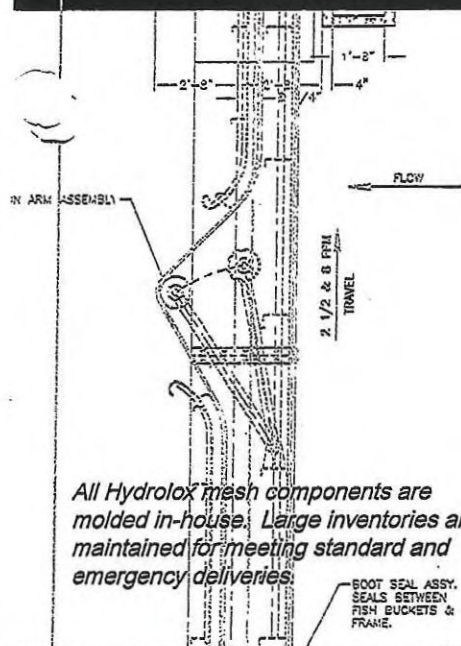
Individual modules are molded with easy-to-clean surfaces that are less likely to bio-foul. Screens are manufactured to order in virtually any width and length.



Extended Water Screen Life

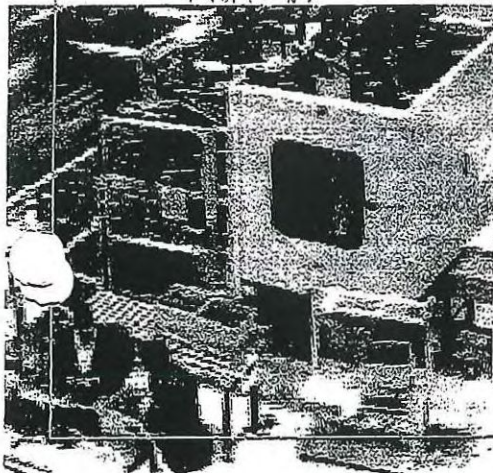
Our traveling water screens are molded in impact-resistant, engineered polymer materials that last two to five times longer than traditional steel chain and basket screen components.

This level of screen performance extends scheduled maintenance intervals and reduces the frequency of screen mesh replacement. All of this adds up to lower operating costs and more efficient labor allocation.



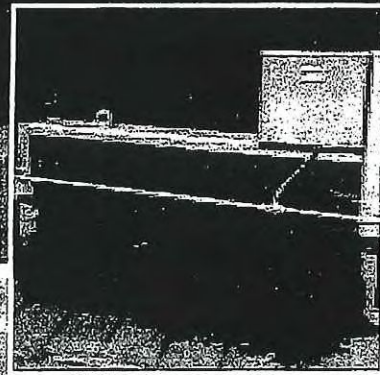
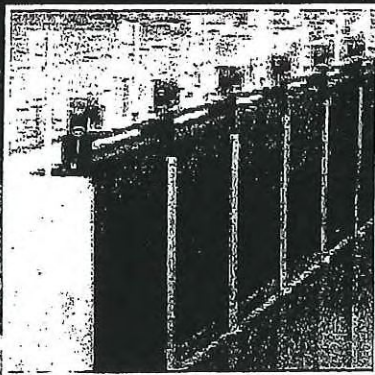
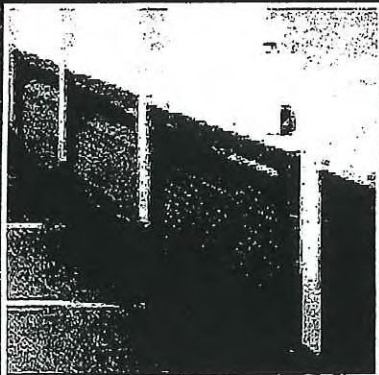
All Hydrolox mesh components are molded in-house. Large inventories are maintained for meeting standard and emergency deliveries.

BOOT SEAL ASSY.
SEALS BETWEEN
FISH BUCKETS &
FRAME.



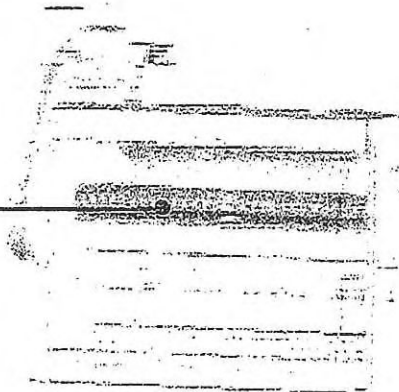
**"I am very impressed with our Hydrolox™ screens...
They are extremely durable as well as easy to
maintain. The design is simple enough to work on
them and very effective at the same time. I would
recommend Hydrolox screens to anybody looking
for a screen."**

**Ben Bollinger
Fall River Rural Electric Cooperative**

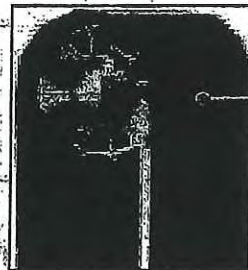


Inside the Hydrolox Water Screen

Positive Drive System
distributes load across entire screen width. Eliminates edge-driven system weaknesses including mistracking and uneven wear; extends system life.

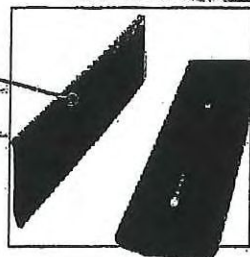


Frames fit into existing guide slots—no need to modify existing intake structure. Screens are manufactured to order in virtually any width and length.

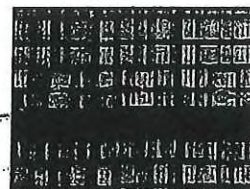


Modules articulate around engineered polymer hinge rods and high-strength stainless steel sprockets.

Patented, detachable debris-handling flights absorb most debris impact without damage. Easily replaced with fish-handling attachments.

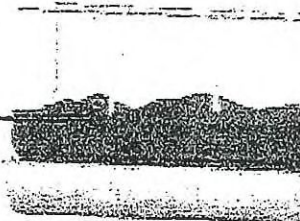


Unique tensioning system actively maintains the correct screen tension. The deck level indicator eliminates guesswork and minimizes unscheduled maintenance.



Reduced debris pass-through. Screen has no gaps larger than the 1.75 mm mesh openings, making it easy to comply with NOAA/NMFS criteria.

No submerged moving parts - patented seal and static shoe at the boot section eliminate the high maintenance common with submerged foot sprockets, bearings, and carrier chains.



Comparing Polymer and Steel Screens

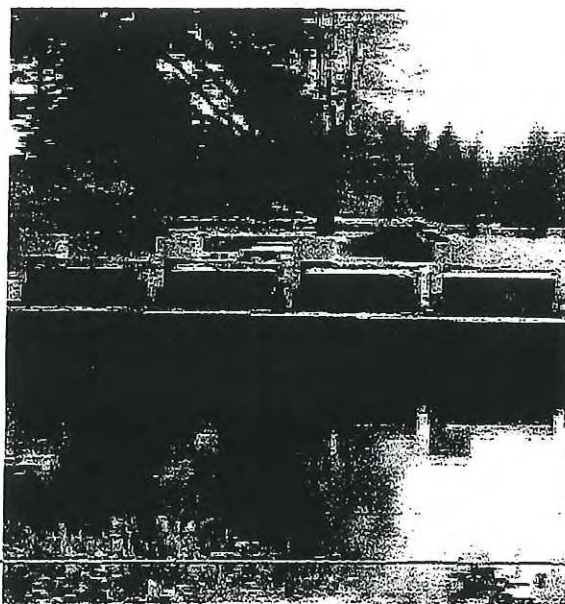
Hydrolox engineered polymer components and innovative screen frame design combine to produce traveling water screens with significant, measurable advantages over conventional chain and basket steel screens.

Major Screen Issues	Steel Vertical Traveling Screen Problems	Hydrolox Engineered Polymer Vertical Traveling Screen Solutions
Limited Screen Life	Screen life is severely limited by highly abrasive environments. Uneven wear on basket chains causes mistracking and shortens screen life.	Engineered polymer screens last 2-5 times longer than steel. Positive drive system eliminates uneven wear and mistracking.
Maintenance	Submerged moving parts increase maintenance and are not easily accessible.	Zero submerged moving parts. Near-zero unscheduled maintenance and downtime.
Operational Costs	Requires frequent maintenance, including repairs that cannot be done on site.	Modular design allows for repairs to be made on site and lowers operational costs.
Corrosion	Steel screening material is highly corrosive, especially in saltwater environments.	Polymers do not corrode.
Bio-foul	Steel components readily bio-foul.	Engineered polymer less likely to bio-foul.
Safety	Heavy steel baskets are difficult to handle and can present safety hazards.	Compact design is approximately 40% lighter. Lightweight engineered polymer material improves worker safety.
Compliance	Difficult to seal. Prone to fish entrapment.	Meet NOAA/NMFS criteria. Smooth surface and tight seals minimize de-scaling.
Debris Carryover		Enhanced design of the screen's spray bar has better mesh coverage and reduces carryover.

A Proven Solution for Reducing Cleaning Time

A recent installation of Hydrolox screening technology at a hydropower plant demonstrated the importance of having an easy-to-clean water screen. Hydrolox screens were installed as part of a complete turbine system overhaul with a goal of reducing the number of man hours spent on screen cleaning.

A year after installing the screens, the plant measured a **75% reduction in time spent on screen cleaning**, at a **savings of \$30,000 a year**. Labor for cleaning was also reduced from two people to one, with the potential to be further reduced to zero by installing a takeaway conveyor for debris removal. The effects of the entire overhaul yielded a bottom-line increase of 600 kilowatt-hours.





Hydrolox
301 Plantation Road
Harahan, LA 70123

Fish-friendly water screen technology, available worldwide



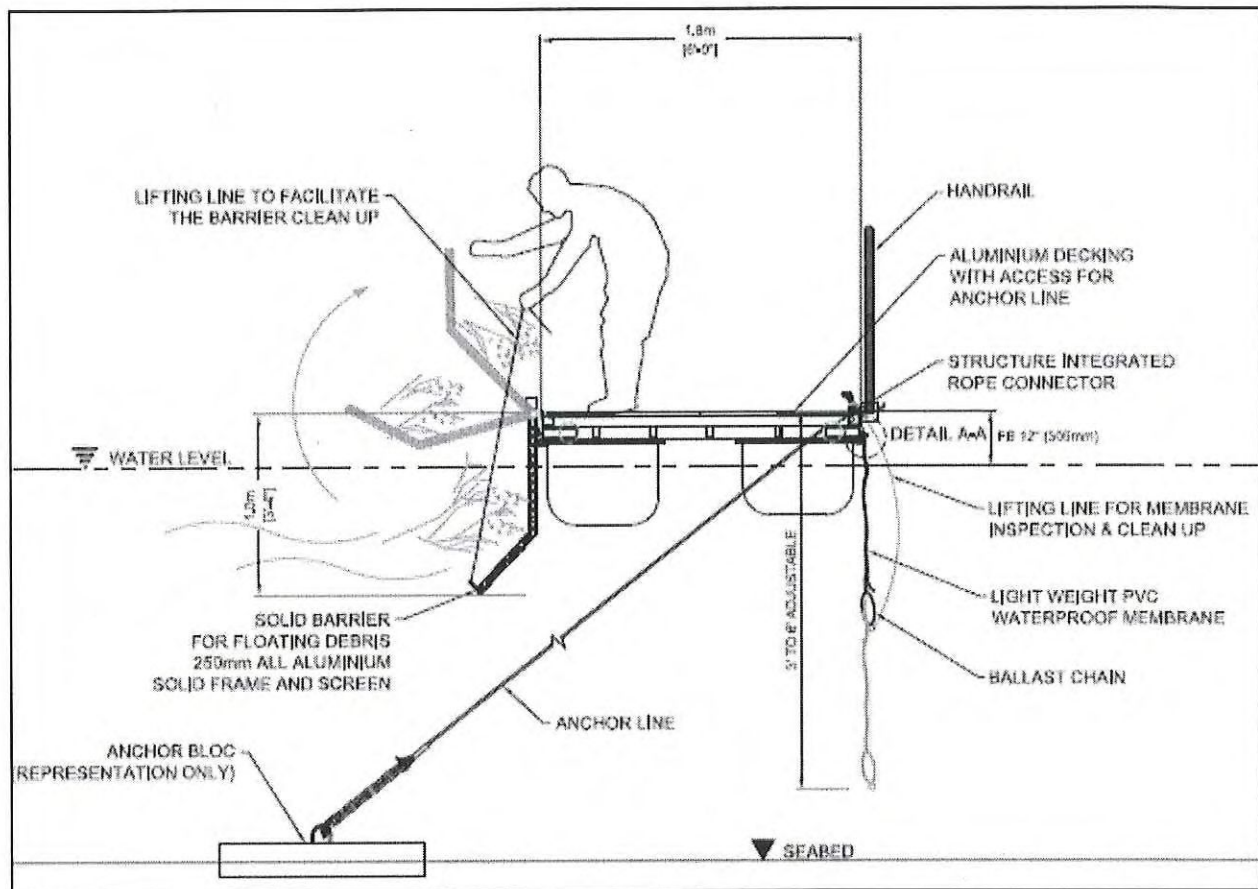
Hydrolox traveling water screens meet or exceed criteria for fish protection across much of the world (such as the NOAA/NMFS specification in the U.S.). These regulations are created to protect designated fish species, and installing Hydrolox screens is the most reliable, cost-effective way to fully comply.

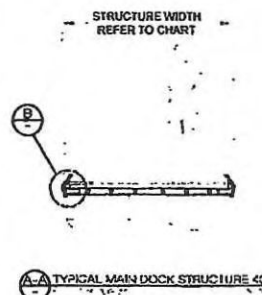
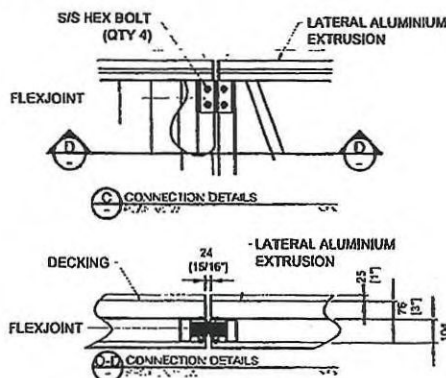
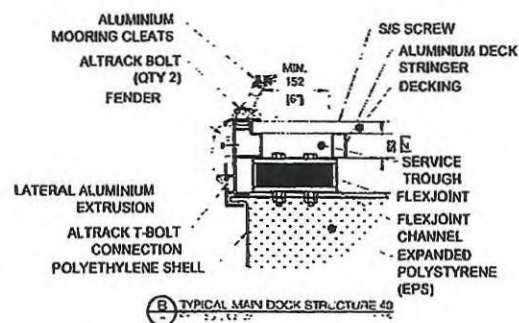
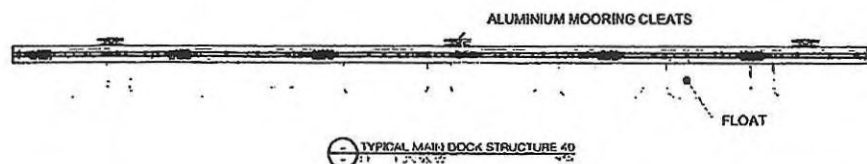
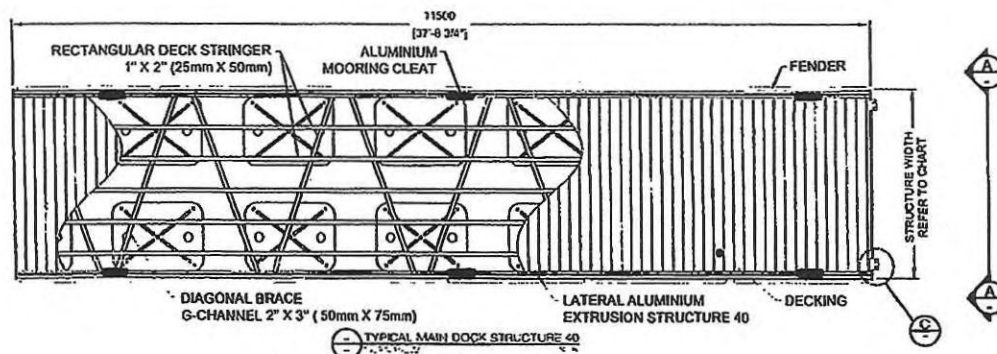
By choosing a Hydrolox screen, you benefit from both outstanding technology and expert customer service conveniently available to you through a network of global corporate offices and assembly centers. And all Hydrolox products are backed by written, money-back performance and delivery guarantees.

For more information contact us at:
North America: **1-866-685-2825** Europe: **+800 3344 5544**
www.hydrolox.com

APPENDIX 7D

FLOATING DEBRIS BARRIER

Floating Debris Barrier
Schematic Drawing



SPECIFICATIONS:

STRUCTURE :
WELDED FRAME 6000 ALUMINIUM
ALLOY EXTRUSION

WELDING :
MIG WELOS CONFORM TO
CSA-W-47.2 & ANSAPWS D1.2
STANDARDS

DECKING :
COMPOSITE WOOD DECKING
5/4\" X 6\" (25 mm X 140 mm)

FLOATS :
POLYETHYLENE SHELL 5 mm (3/16\")
FILLED WITH EPS AT 16 Kg/m³
(1 LB/FT³) DENSITY,
QUANTITY ACCORDING TO
RESERVE OF BUOYANCY.

FENDER :
COMPOSITE WOOD

CONNECTION :
NOISE-FREE RUBBER BLOCK
CONNECTION

BOLLARDS :
CASTING -
ALUMINIUM ALLOY AA356

SERVICE TROUGH :
UNDER DECK
OPTION: ALUMINIUM TROUGH COVER

FEATURE : S/S ALTRACK \"T\" BOLT
TO SECURE ACCESSORIES

WIDTH

MODELS	IMPERIAL	METRIC
MD-120	4'-0"	1.2m
MD-150	5'-0"	1.5m
MD-180	6'-0"	1.8m
MD-200	6'-7"	2.0m
MD-250	8'-3"	2.5m
MD-300	9'-10"	3.0m

NOTE:

- TYPICAL DRAWING.
- DIMENSIONS SHOWN ARE NOMINAL AND MAY VARY ACCORDING TO THE APPLICATION.
- FLOATS QUANTITY IS FOR REPRESENTATION ONLY.

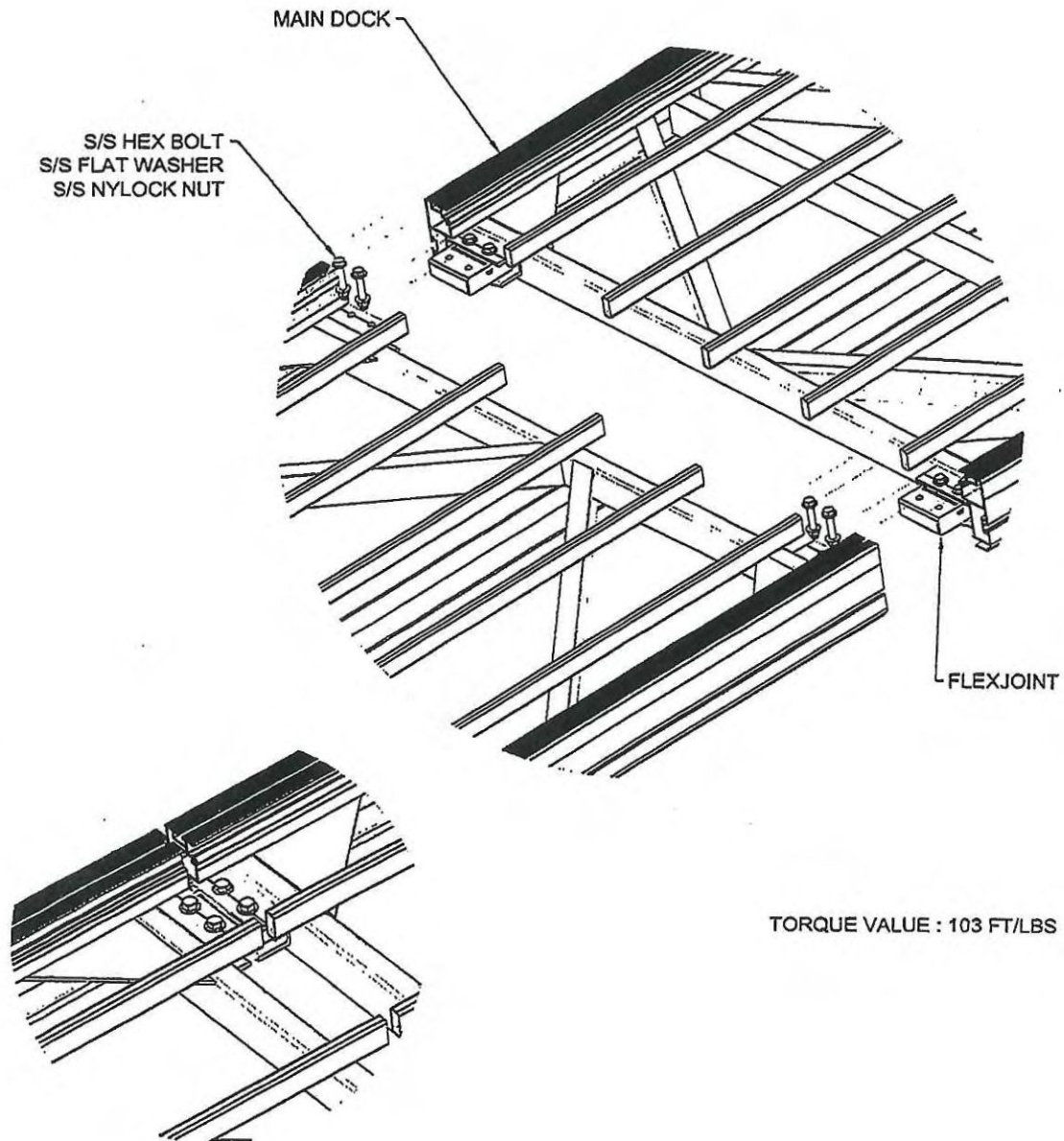
N.T.S


TPMD-0040

M.A.M

25042012

1/1




ASSEMBLY DETAIL
 ISOMETRIC VIEW N.T.S.



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TITLE

MAIN DOCK TO MAIN DOCK CONNECTION ASSEMBLY

DATE

2012-04-20

DRAWN BY

T.L.

REVISION DATE

DOCUMENT NO.

MDY-000024

SHEET

1/1

SPECIFICATIONS:

MATERIAL:

MILL FINISHED ALUMINIUM PIPE

JOINING:

MILL FINISHED PERMANENT MOLD
CAST ALUMINIUM-MAGNESIUM
FITTINGS

HARDWARE:

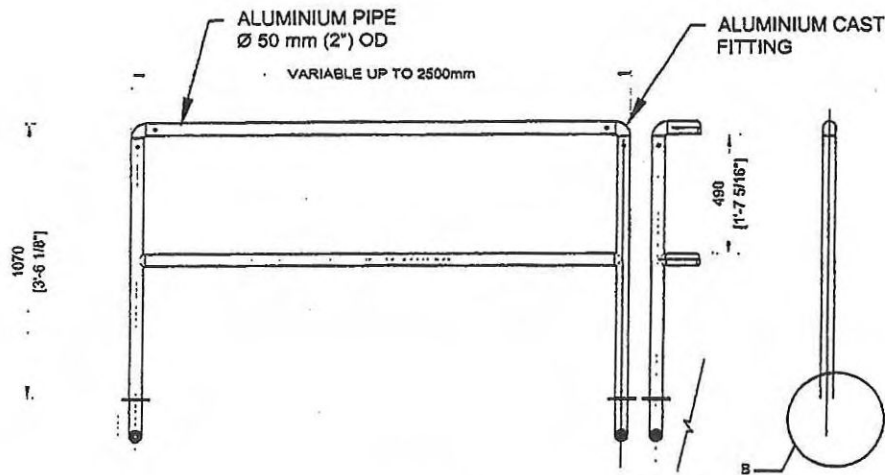
316 STAINLESS STEEL T BOLTS
AND NUTS

HORIZONTAL ALLOWABLE LOAD:

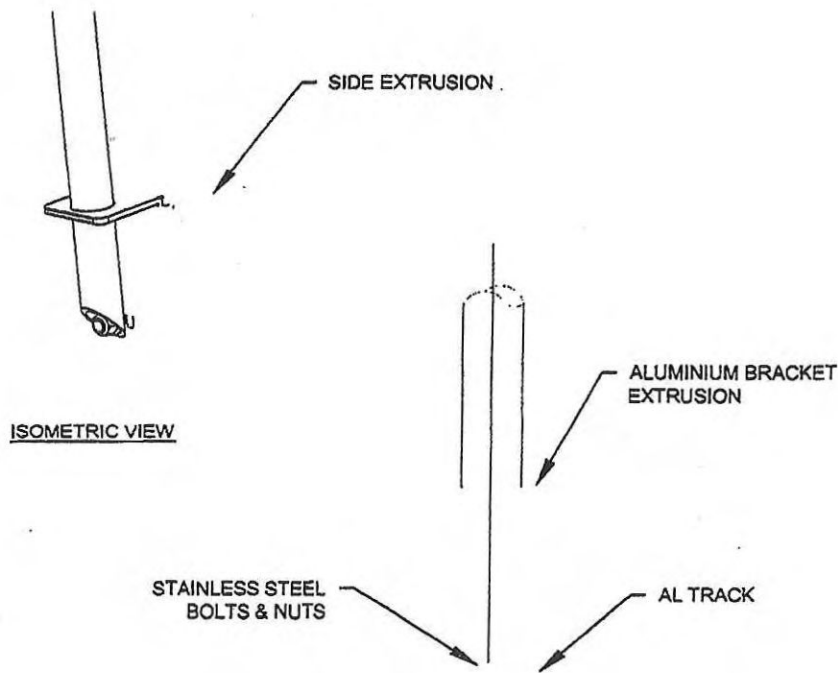
0,75 kN/m

CONCENTRED ALLOWABLE LOAD:

1,0 kN



ELEVATION



DETAIL -B



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TITLE

DATE

REVISION

2013-06-12

T.L.

REMOVABLE HANDRAIL

PROJ. NO. 0000

ISSUE NO. 0000

HDY-000096

SHEET
1/1

SPECIFICATION:

MATERIAL:

WELDED 6000 ALUMINIUM
ALLOY EXTRUSION

WELDING:

MIG WELD CONFORM TO CSA-W47.2
ANSI/AWS D1.2 STANDARDS

HARDWARE:

S/S 304 BOLTS AND NUTS

FEATURE:

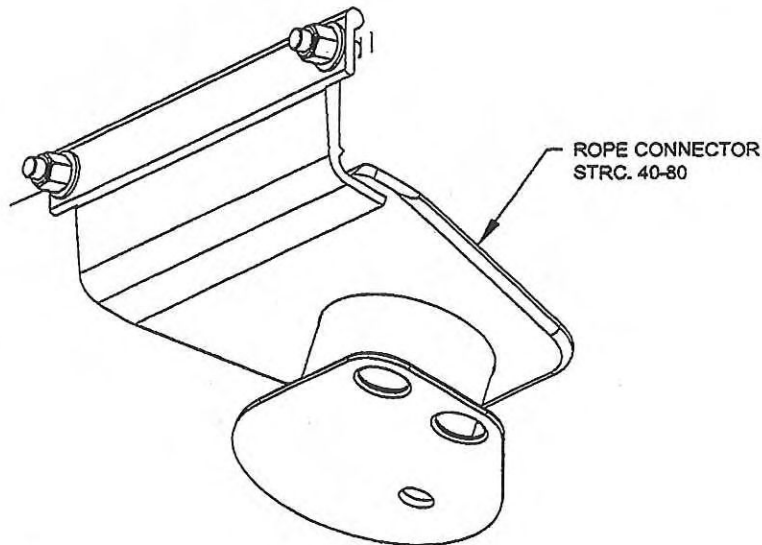
ALTRACK T BOLT

W.L.D:

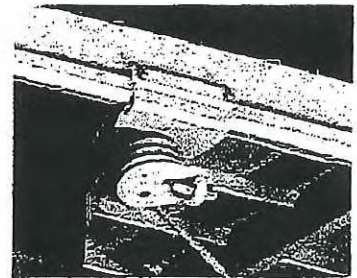
5 TON

ROPE SIZE CAPACITY:

UP TO 30 mm Ø



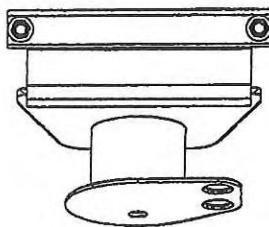
ROPE CONNECTOR
STRC. 40-80



ROPE CONNECTOR PICTURE

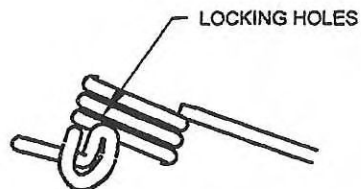
ASSEMBLY DETAIL

360
[1'-2 3/16"]



FRONT VIEW

196
[7 11/16"]



LOCKING HOLES

SECTION VIEW



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TITLE

ROPE CONNECTOR FOR STR. 40 & 80

DATE

2012-05-28

DRAWN BY

T.L.

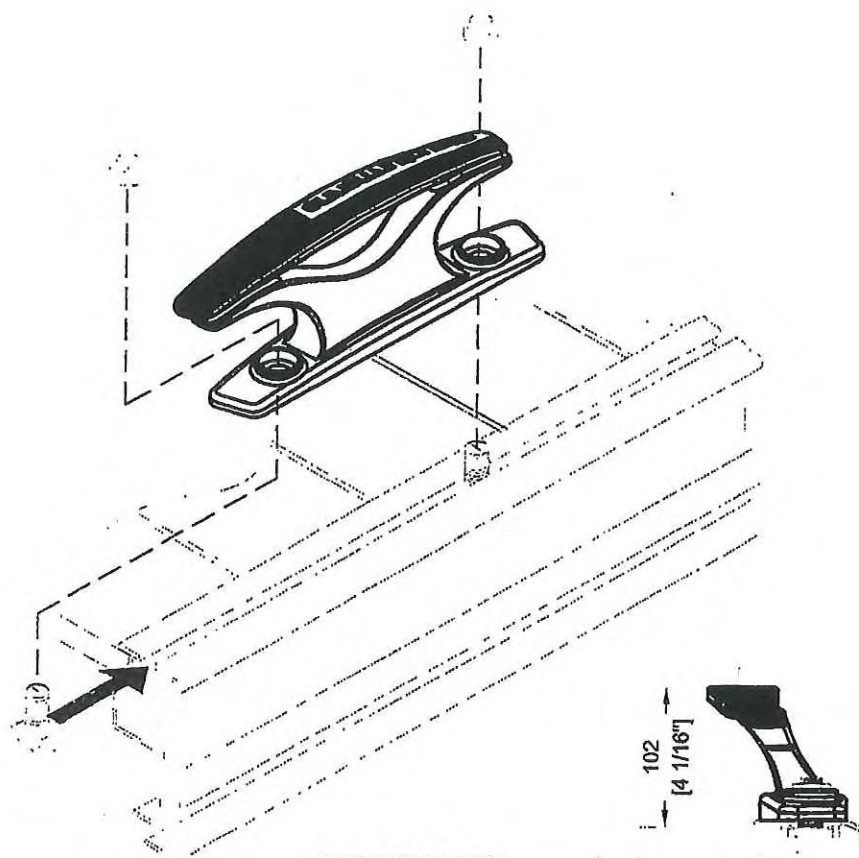
REVISION DATE

DOCUMENT NO.

ANFB-00339

SHEET

1/1



ASSEMBLY DETAIL

SPECIFICATIONS:

MATERIAL:

CAST ALUMINIUM A-356.1 T6

S.W.L CAPACITY:

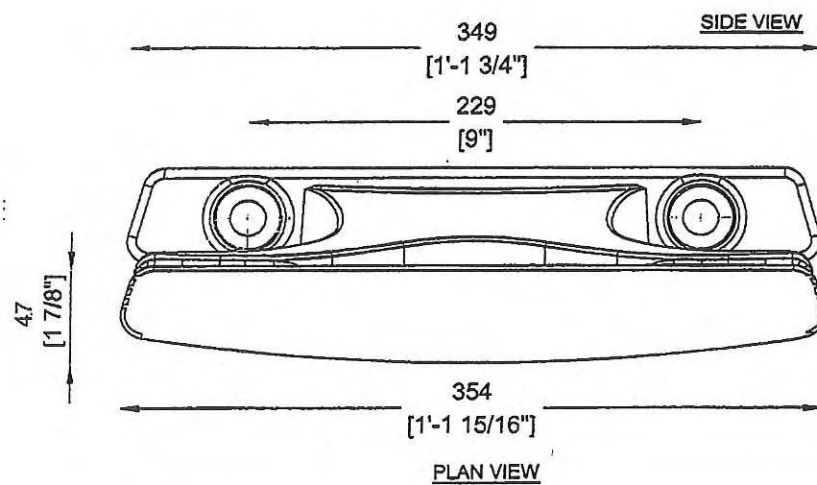
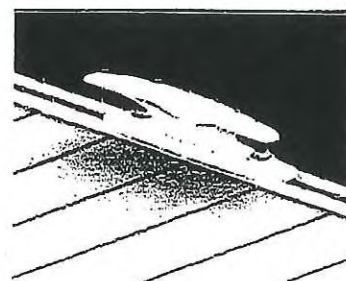
2.5 TON

HARDWARE:

304 S/S BOLTS AND NUTS

FEATURE:

ALTRACK 'T' BOLT



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TITLE

ALUMINIUM CLEAT 40

DATE

2012-07-19

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REVISION

DOCUMENT NO.

MIS-000014

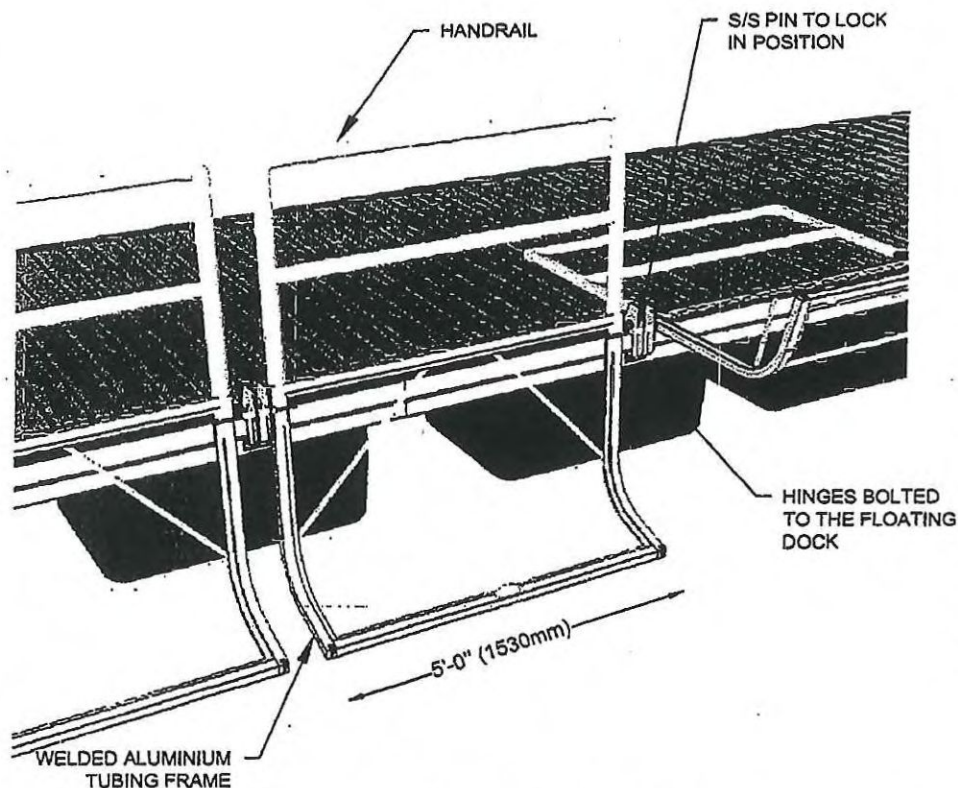
SHEET

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SPECIFICATION:

MATERIAL:

6000 MARINE GRADE ALUMINIUM

WELDING:

MIG WELD CONFORM TO CSA-W47.2
ANSI/AWS D1.2 STANDARDS

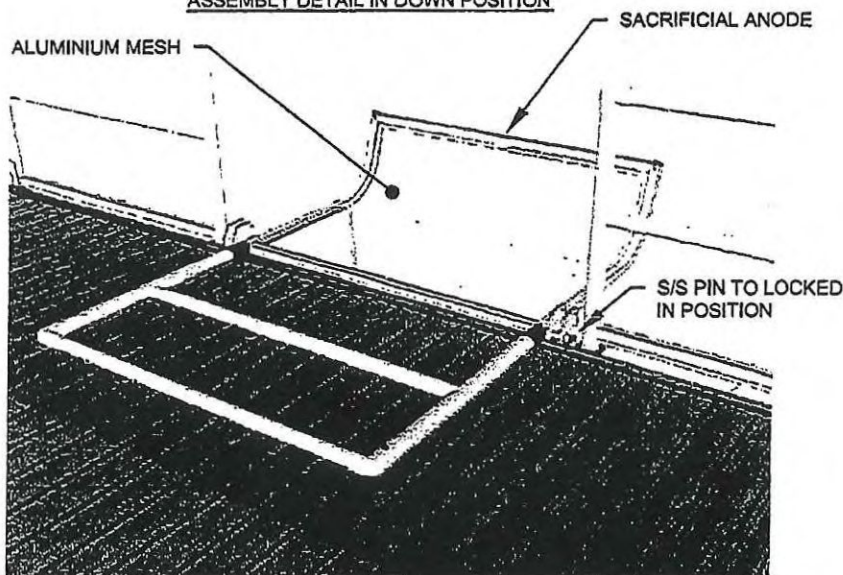
HARDWARE:

S/S 304 BOLTS AND NUTS
TUBULAR ALUMINIUM FRAME
60" x 36" SCREEN MESH
LOCKING BRACKET
VERTICAL OR HORIZONTAL
POSITION
SACRIFICIAL ANODE

FEATURE:

METAL DIAMOND MESH PATTERN
WELDED TO THE FRAME
ATTACHES TO THE LATERAL
BEAM OF STRUCTURE
THIS SCREEN PIVOT
TO FACILITATE CLEANING
SCREEN DEPTH : 24"
BELOW WATER LEVEL

ASSEMBLY DETAIL IN DOWN POSITION



ASSEMBLY DETAIL IN LIFTED POSITION



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TITLE

DATE

DRAWN BY

2013-06-12

T.L.

DEBRIS BARRIER SOLID SCREEN

DATE

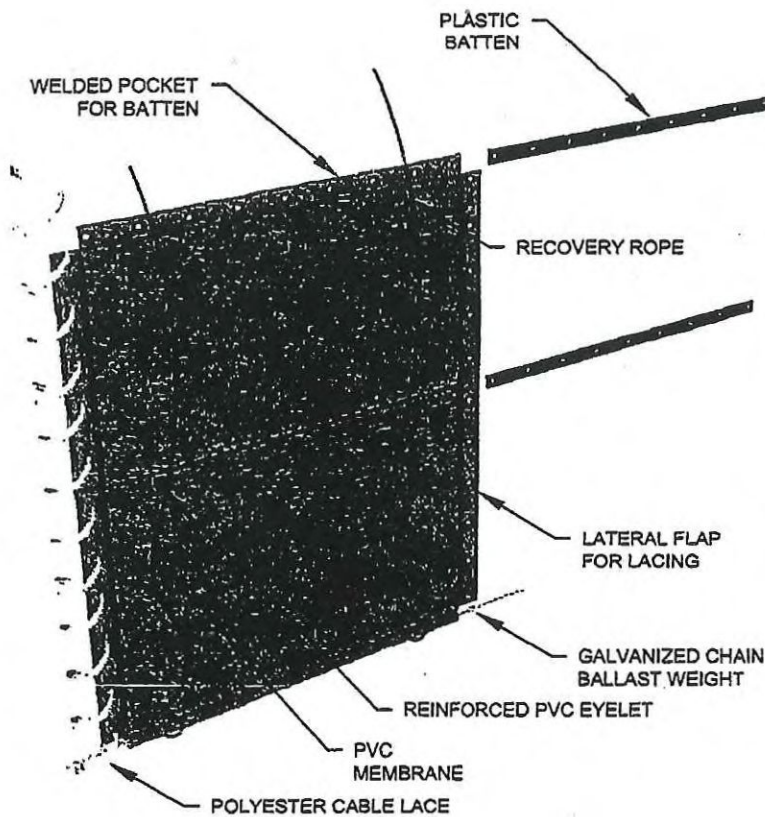
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7119-SK-01

DATE

SHEET

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SPECIFICATION:

MATERIAL:

PVC COATED MEMBRANE (13oz)
COLOR: BLACK

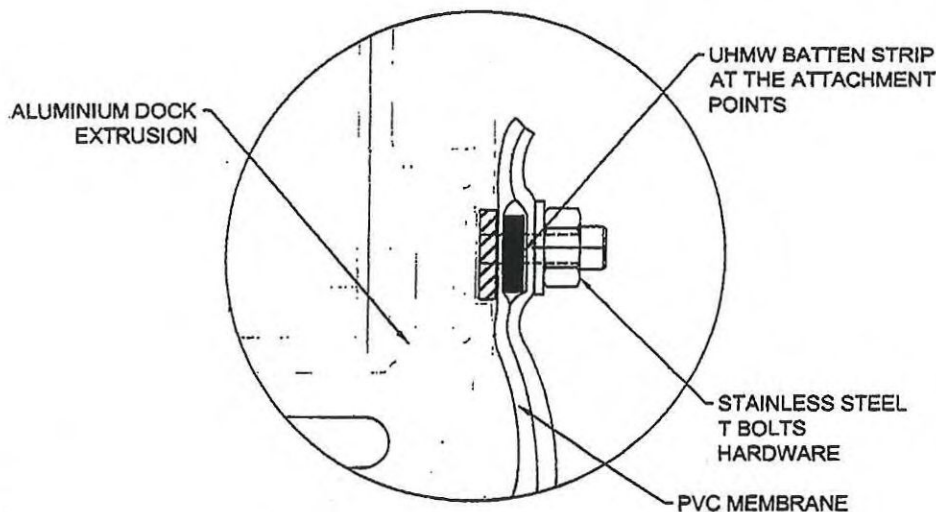
HARDWARE:

S/S 304 BOLTS AND NUTS
HOT DIP GALVANIZED CHAIN BALLAST

FEATURE:

PVC IMPERMEABLE
DOUBLE LAYER WELDED MEMBRANE
REINFORCED CONNECTOR WITH
PLASTIC BATTEN
LATERAL FLAPS FOR LACING
 $\frac{5}{16}$ " HOT DIP GALVANIZED BALLAST
CHAIN 1.4lbs/Ft
 $\frac{1}{2}$ " NYLON RECOVERY ROPE (250cm)
STD LENGTH: BY 40' SECTION

ASSEMBLY DETAIL



ASSEMBLY DETAIL CONNECTED TO DOCK



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TITLE

DEBRIS BARRIER PVC MEMBRANE

DATE

2013-06-12

DRAWN BY

T.L.

DOCUMENT NO.

7119-SK-02

REVISIONS

2-17-11

1/1